

PATENT APPLICATION

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IMPROVED STEP ILLUMINATION APPARATUS

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The subject invention relates generally to lighting apparatus and more particularly to an improved step illumination fixture.

5 2. Description of Related Art

Various efforts have been made to improve lighting fixtures for illumination of steps in a staircase. One such effort is evidenced by U.S. Patent 5,918,962 assigned to the assignee of the present application and entitled Dual Step Light and Indicator Apparatus. Such efforts have typically employed an extrusion 10 having step and riser plate portions and electrically activated lighting devices located in the extrusion. Such lighting apparatus finds typical application in darkened theatre settings where it is desired to light the descending aisleway for patrons.

3. Summary of the Invention

The subject invention relates to a step lighting apparatus which employs an 15 ambient light reflective strip to alert users to the location of step edges in darkened or low light environments. Apparatus according to the invention may be conveniently used in conjunction with seat-mounted lights to provide a theatre step light fixture with no electrically activated lighting devices.

A preferred embodiment of the just-summarized invention will now be described in detail in conjunction with the drawings, of which:

Figure 1 is a perspective view of a lighting apparatus according to the preferred embodiment of the invention;

Figure 2 is a cross-section taken at 2-2 of Figure 1;

Figure 3 is an enlarged view of a portion of Figure 2;

5 Figure 4 is a perspective view illustrating one application of the preferred embodiment;

Figure 5 is a front view of a beacon lamp unit as used in Figure 4; and

Figures 6 and 7 are perspective views illustrating a preferred beacon lamp.

10 Figure 8 is a perspective view illustrating a typical theatre stairway illumination pattern.

DETAILED DESCRIPTION

OF THE PREFERRED EMBODIMENTS

The preferred lighting apparatus is illustrated in Figures 1-3. As shown, 15 the apparatus includes a horizontal step plate portion 13 and a vertical riser plate portion 15. The step plate portion 13 includes a flat undersurface 17, which typically abuts the horizontal surface of a step, while the riser plate portion 15 includes a flat vertical undersurface 19 which typically mounts against the vertical riser portion of a step. The particular embodiment shown further includes respective carpet insert slots 21, 23. A 20 number of ribs 25, 27, 29, 31 are formed between the inner surfaces 15, 17 and the outer surface 33 of the apparatus, which includes a horizontal or "tread" portion 35 and outer riser surface 37.

As further illustrated, a rounded nose portion 38 includes a light reflective layer 39, which forms a continuous outer surface with surfaces 35 and 37. In 25 the preferred embodiment, reflective layer 39 is applied by coextrusion with the remainder of the structure. In this connection, layer 39 preferably comprises a light gray polyvinyl chloride (PVC) strip coextruded with a black or other dark PVC material to form the entire unit 11. The dark PVC may comprise .075 inch thick GEON C9000 (shore) black PVC plastic, while layer 39 comprises PVC material #291 as available 30 from A&B Plastics, Yakima, Washington.

It has been discovered that when units 11 are disposed on each of the noses of a succession of stairs, the light gray coextruded strip reflects sufficient ambient light to alert users as to the location of the edges of the step without requiring the use of electrically activated light sources within the unit 11. Such light sources could of course still be employed, if desired.

Lighting apparatus according to the preferred embodiment may advantageously be used in conjunction with seat-mounted lamps 111, as shown in Figure 4. The seat-mounted lamps 111 may be so-called beacon lamps as shown in Figure 5. Various constructions for beacon lamps are described in pending U.S. Patent Application Serial No. 09/175,644 entitled Seat Mounted Aisle Step Light assigned to the assignee of this application and incorporated herein by reference. The particular beacon lamp embodiment shown in Figure 5 includes a hemispherical lens 15, a circular housing 13 and a lamp holder shield 17. The particular embodiment of Figures 4 and 5 receives power via a feedwire 21 located behind a wireway 19. Various other ways of providing power to lamps, e.g. LED's, located beneath the shield portion of lampholder shield 17 may be provided.

An alternate and presently preferred beacon lamp 211 is illustrated in Figures 6 and 7. The lamp 211 includes a hemispherical lens 115, the upper half 116 of which is rendered opaque by suitable coating. A housing 113 has a lampshield mounting component 114 attached thereto, e.g. welding. The component 114 includes a mounting pad 116 to which a lampholder shield 117 is attached, e.g. by screws inserted through pairs of holes 120, 122. The lampshield 117 includes a mirrored undersurface 118.

The component 114 may be formed of bendable metal such that the pad 114 can be bent to a desired angle to adjust or aim the light pattern provided by four LEDs 124 mounted in the lampholder shield 117 and powered via lead wires 126. The LEDs may be 4/10 watt ultrabrite LEDs powered via lead wires 126. 117

As may be appreciated, the lampholder shield 117 directs illumination in a manner which illuminates the side of an aisleway. An illustrative lighting pattern is shown in Figure 6, wherein beacon lamps employing four amber LEDs are used on one side of an aisleway with 36" wide steps, a 6" riser and 40" pitch. The decimal numbers represent light distribution in foot candles with an average of .20 foot candles.

~~S~~ ~~1~~ Light distributions such as shown in Figure 8 typically will not clearly illuminate the edges of the steps down the aisleway. The obscurity of the edge of the steps is particularly pronounced with LED light sources because the light is monochromatic and does not produce a great deal of contrast. Provision of step-mounted fixtures such as 5 that shown in Figures 1-3 provide a means of capturing and reflecting low level ambient light to provide clear demarcation of the step edges. The effect created is particularly striking and surprising to the observer. Thus, in a lighting system such as shown in Figure 4, respective reflective layers ²⁹ of the units 11 respond to relatively low-intensity or low-level ambient light generated by the beacon lamps ²¹ ₁₁ to render the 10 strips ²⁹ visible in the dark to persons traveling the staircase.

From the above description, those skilled in the art will appreciate that various adaptations and modifications of the just-described preferred embodiments can be configured without departing from the scope and spirit of the invention. Therefore, it is 15 to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically described herein.